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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,763	12/12/2001	Vijay A. Deshpande	12801.0080.NPUS00	8658

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EXAMINER

DOROSHENK, ALEXA A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/020,763

Applicant(s)

DESHPANDE, VIJAY A.

Examiner

Alexa A. Doroshenk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 is/are allowed.
- 6) ☒ Claim(s) 1,2,5-7,13-18,20,22,25 and 26 is/are rejected.
- 7) ☒ Claim(s) 3,4,8-12,19,23, 24 and 27-29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/29/02 & 8/21/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 6, 7, 13, 14, 16, 17 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Clawson et al. (US 6,641,625 B1).

With respect to claim 1, Clawson et al. discloses an compact fuel processor (12) for converting a hydrocarbon fuel feed into hydrogen rich gas (col. 2, lines 34-42); the hydrogen rich gas suitable for feed to a fuel cell (col. 1, lines 18-28); and wherein the assembly comprises an oxidation core vessel (34) containing an oxidation catalyst (col. 11, lines 48-50).

With respect to claim 2, Clawson et al. further discloses a reforming vessel (35) surrounding the oxidation core vessel (34) and having an autothermal reforming catalyst therein (col. 12, lines 1-17).

With respect to claim 22, Clawson et al. further discloses wherein a desulfurization catalyst bed can surround the reforming vessel (col. 22, lines 5-10).

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With respect to claim 6, Clawson et al. further discloses a second desulfurization vessel (14) is external to the processor (12) for desulfurizing the feed (col. 26, line 64-col. 27, line 4).

With respect to claim 7, since Clawson et al. discloses that the second desulfurization vessel (14) is a separate unit, it is inherently replaceable.

With respect to claim 13, Clawson et al. discloses a compact fuel processor for converting a hydrocarbon fuel feed into hydrogen rich gas (col. 2, lines 34-42) comprising:

- a reforming module (12) for converting hydrocarbon fuel into a hydrogen rich gas suitable for use in a fuel cell (col. 2, lines 34-42) and wherein the hydrogen rich gas has a carbon monoxide level that is less than 10 ppm (col. 15, lines 57-59); and

- an oxidizing module (14) for oxidizing fuel cell anode tail gas to produce a hot exhaust gas (col. 26, lines 10-15), wherein the hot exhaust preheats the hydrocarbon fuel feed to the reforming module (col. 26, lines 50-67).

With respect to claim 14, Clawson et al. further discloses wherein the oxidizing module (14) comprises:

- an oxidation core vessel (110) containing an oxidation catalyst (col. 26, lines 16-19); and

- a first desulfurizing vessel (118, 119, 120) surrounding the oxidation core vessel (110) filled with desulfurization catalyst (col. 26, line 67- col. 27, line 4).

With respect to claim 16, Clawson et al. further discloses wherein the reforming module (12) comprises:

a reforming core vessel (12) containing an autothermal reforming catalyst bed (col. 1, lines 18-28 and col. 11, line 31- col. 12, line 16); and

wherein a second desulfurization catalyst bed can surround the reforming vessel (col. 22, lines 5-10).

With respect to claim 17, Clawson et al. further discloses wherein the hydrocarbon feed is desulfurized (via 118, 119, 120; col. 26, line 67- col. 27, line 4).

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson et al. (US 6,641,625 B1).

Clawson et al. discloses the limitations as discussed above, but fails to disclose external fins on the oxidation core vessel (110). Despite this failure, Clawson et al. does teach wherein external fins are beneficial in a compact reactor design to enhance heat exchange (col. 17, lines 34-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide external fins to the reactor core vessel in order to achieve enhanced heat exchange in this hydrocarbon feed pre-heating area.

5. Claims 5 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson et al. (US 6,641,625 B1), as applied to claims 1 and 16 above, and further in view of Collins et al. (5,458,857).

Clawson et al. discloses the limitations as discussed above, but fails to disclose an electrical heater for the autothermal reforming catalyst bed.

Collins et al. also discloses a compact annularly arranged reformer for generating a hydrogen suitable for fuel cells and teaches wherein an electrical heater can be used in the reforming chamber to raise the temperature of the reforming chamber so as to be self sustaining (col. 11, line 66- col. 12, line 17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an electric heater to the reforming bed of Clawson et al. in order to provide a means to heat the reformer to a temperature suitable for a self-sustaining reaction.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson et al. (US 6,641,625 B1), as applied to claim 14 above, and further in view of Kudo et al. (US 6,413,479 B1).

Clawson et al. discloses the limitations as discussed above including wherein the hydrocarbon feed is preheated and desulfurized in the first annular space (118, 119, 120) to create a desulfurized hydrocarbon fuel feed (col. 26, line 67- col. 27, line 4), but fails to disclose wherein the oxidizing module comprises a heat exchange coil wherein hot exhaust in the coil preheated the hydrocarbon fuel feed.

Kudo et al. also discloses a compact annularly arranged reformer for generating a hydrogen suitable for fuel cells and teaches wherein an oxidation unit formed into a coil-like shape increases the efficiency of heat exchange (col. 7, lines 35-41), therefore, it would have been obvious to one of ordinary skill in the art at the time the invention

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was made to shape the oxidation vessel of Clawson et al. in the form of a coil in order to improve the efficiency of heat exchange with the hydrocarbon fuel feed.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson et al. (US 6,641,625 B1), as applied to claim 16 above, and further in view of Edlund (5,861,137).

Clawson et al. discloses the limitations as discussed above, but fails to disclose wherein a heat exchanger coil is used to pre-heat the hydrocarbon fuel feed with the generated hydrogen rich gas.

Edlund also teaches a compact reformer for generating a hydrogen suitable for fuel cells and teaches wherein the feed is preheated by heat exchange in a coil with the hydrogen product (col. 6, lines 1-5 and col. 9, lines 4-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the preheating means of Edlund in the device of Clawson et al. since Clawson et al. requires preheating of the fuel feed and in order to efficiently make use of the heat of the product of the device.

Allowable Subject Matter

8. Claim 21 continues to be allowed.

9. Claims 3, 4, 8-12, 19, 23, 24 and 27-29 are objected to as being dependent upon a rejected base claim, but would be allowable if claims 23 and 27 were rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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10. The following is a statement of reasons for the indication of allowable subject matter: Though the prior art does teach the limitations as discussed above, the prior art neither teaches nor suggests the apparatus as claimed wherein a shift vessel annularly surrounds the desulfurization vessel which annularly surrounds a reforming vessel.

Response to Arguments

11. Applicant's arguments with respect to claims 1-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexa A. Doroshenk whose telephone number is 571-272-1446. The examiner can normally be reached on Monday - Thursday from 9:00 AM - 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alexa Doroshenk
Patent Examiner
Art Unit 1764

May 27, 2004